4.5% body weight/day during this time, compared to 3.5%/day for the cold-water group; they were almost three times larger at the end of this phase. Beyond four months, growth slowed and became logarithmic in form, with growth rates near 1.0%/day. Males were consistently larger than females. In summary, this species appears very well suited for laboratory culture. It tolerates high density rearing conditions without aggression or disease problems, it eats a wide range of live and dead foods, and it grows well over a wide temperature range.

LABORATORY CULTURE OF THE CALIFORNIA MARKET SQUID *LOLIGO OPALESCENS* THROUGH THE ENTIRE LIFE CYCLE. Raymond F. Hixon, Won Tack Yang, Philip E. Turk, Mark J. Krejci, A. Michelle Parsons, Lea A. Bradford and **Roger T. Hanlon,** The Marine Biomedical Institute, The University of Texas Medical Branch, Galveston.

Loligo opalescens, Berry was cultured through the entire life cycle in two separate experiments (1981 and 1982). Hatchling squids were reared for two months in a circular 1,300 ℓ closed-system tank, then transferred and cultured to sexually mature adults in 10,000 ℓ and 13,000 ℓ closed-system raceways of different design. At six months of age, adult squids mated and females began to lay egg capsules. The eggs developed into normal second-generation hatchlings in both experiments. Water temperature was between 14 and 19°C; salinity varied from 34 to 36‰; pH fluctuated from 7.8 to 8.2; and levels of ammonia-, nitrite-, and nitrate-nitrogen were usually below 0.1, 0.1 and 20.0 mg/ℓ, respectively. Survival after six months was 6.8% of 2,061 hatchlings in 1981 and 2.6% of 1,704 in 1982. Maximal life span was eight months. Mean mantle length (ML) and wet weight (WW) of adults from the two experiments were 87 mm ML ($S\bar{x}$ = 2.7) and 23.8 g WW ($S\bar{x}$ = 1.9) for males (n = 35), and 83 mm ML ($S\bar{x}$ = 1.9) and 21.2 g WW ($S\bar{x}$ = 1.5) for females (n = 58). Maximum size for males was 115 mm ML and 58.2 g WW, and 116 mm ML and 63.0 g WW for females. Mantle length increased slowly at a rate of 2.0 (1981) and 5.7 mm/mo (1982) during the first two months posthatching; thereafter, mantle length increased at a nearly constant rate of 12.6 (1981) and 13.8 mm/mo (1982). The length-weight relationship of laboratory cultured squids was similar to that observed in the wild population. Squid diet consisted of live crustaceans (zooplankton or mysid, penaeid, and palaemonid shrimps) and fishes (several species, from six different families). The feeding rate of subadult and adult squids averaged 14.9% wet body weight per day. The major causes of mortality were starvation, fin damage, cannibalism and mortality associated with spawning.

GROWTH RINGS IN THE STATOLITHS OF YOUNG LABORATORY CULTURED SQUIDS (*LOLIGO OPALESCENS*). Raymond F. Hixon and **Margarita R. Villoch,** The Marine Biomedical Institute, The University of Texas Medical Branch, Galveston.

Statoliths were obtained from California market squids that were cultured from hatchlings to adults, for a maximum of 235 days. The age of cultured squids was known to within 5 days. Total statolith length (TSL, measured across the anterior surface of the statolith from the edge of the dorsal dome to the tip of the rostrum) increased from approximately 150 μm at hatching (2.5–3.2 mm mantle length, ML) to nearly 1,200 μm at day 235 (age 235–240 days; male, 100 mm ML). Forty-nine statoliths were collected from 29 squids between days 21 (age 21–26) and 65 (age 65–70). Growth rings were visible in a single optical plane in only two of the 49 statoliths when examined whole under a compound microscope (Leitz Orthoplan with filters NG36 and S546). All statoliths were then decalcified in a 1:1 mixture of 4% EDTA in distilled water and 0.2 M sodium cacodylate buffer (pH 7.4). Rings in the decalcified statoliths were more visible, prominent and easier to separate and count than rings observed before treatment. This method was not effective with statoliths from squids older than 65 days (TSL > 600 μm) because decalcified statoliths became amorphous, and rings were no longer clear. For the period between 21 and 65 days, the number of rings in 43 decalcified statoliths (six not legible) were counted from photographic prints taken with a Leitz Combiphot II and Kodak copy film No. 4125. The linear relationship between the number of rings (R) and the age in days (D) was: $R = -7.24 + 1.13\,D$, with an r^2 value of 0.90. Counts of rings differed from the actual age by an average of ± 4.2 (range −12 to +8). These preliminary counts indicate that rings in statoliths of young laboratory cultured squids were formed daily. One possible implication is that feeding (12 hours food, 12 hours no food) was responsible for ring formation because there was no diurnal fluctuation in light or temperature.

FATAL PENETRATING SKIN ULCERS IN LABORATORY REARED OCTOPUSES. Roger T. Hanlon,[1] John W. Forsythe,[2] Kay M. Cooper,[1] Anthony R. DiNuzzo,[2] Dean S. Folse,[2] and **Michael T. Kelly,[2]** The Marine Biomedical Institute,[1] The Department of Pathology,[2] The University of Texas Medical Branch, Galveston.

Young *Octopus joubini* and *Octopus briareus* (35 to 60 days old) developed skin ulcers when reared in high density groups. Octopuses reared in individual containers in the same culture system were disease-free. The ulcers first affected the epidermis of the mantle then penetrated downward through the dermis and underlying muscle tissue. Untreated octopuses usually died within four days. The four gross stages of ulceration were (1) dermal chromatophores stopped functioning and pigment granules dispersed, (2) dermis was destroyed leaving clear areas of skin, (3) necrosis progressed inward causing deep and wide ulcers, (4) ulcers spread to the ventral mantle of *Octopus joubini* or the head and arms of *Octopus briareus*. No viruses or fungi were observed in skin samples, but five species of bacteria were isolated from ulcers: *Vibrio alginolyticus, Vibrio damsela, Pseudomonas stutzeri* and *Aeromonas caviae* from *Octopus joubini; Vibrio parahaemolyticus, Vibrio damsela* and *Pseudomonas stutzeri* from *Octopus briareus*. Bacteria could